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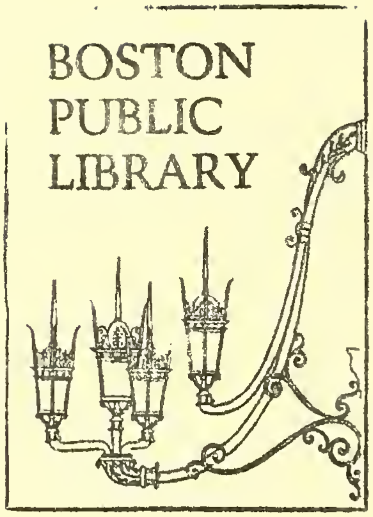

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ESTIMATING THE IMPACT OF 100% OF MARKET VALUE PROPERTY TAX ASSESSMENTS OF BOSTON REAL ESTATE

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THE BOSTON URBAN OBSERVATORY

August, 1974

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I. INTRODUCTION AND SUMMARY

While Massachusetts law requires the property tax base to be the full market value of taxable property, in fact current assessments in Boston depart considerably from this valuation.[1] Moreover, current assessments depart differentially or unequally rather than uniformly from market values, so that replacing these assessments by market values would lead to higher property taxes for some properties and lower taxes for others.

In this report we measure and evaluate the initial (or immediate) pattern of real property tax redistribution which would occur if Boston were to base its property tax on full market value rather than current assessments.

To this end we have developed as of 1972 estimates of market and current assessed value of taxable properties by broad categories--residential, commercial (further subdivided by use), and "other" (primarily vacant land). These estimates are based on fragmentary data and numerous assumptions, many of them questionable. Yet we believe that they are sufficiently accurate to suggest the orders of magnitude of the redistribution of tax liabilities attendant on changing the basis of property valuation for tax purposes.

We emphasize that our study is far from definitive. Before full value assessment (or one of the alternatives discussed in the body of our report) is implemented, much more study of Boston market values would be in order.

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[1] For legal references and other information, see O. Oldman and H. Aaron, "Assessment-Sales Ratios Under the Boston Property Tax", 18 National Tax Journal 36-49 (March 1965), reprinted with data through 1966 in 4 Assessors Journal 13-29 (April 1969), and also D.E. Black, Inequalities in Effective Property Tax: A Statistical Study of the City of Boston (MIT, Ph.D. dissertation, 1969), and M.G. Woodbury, Experiments in Restructuring the Property Tax (MIT Master of Science Thesis, 1970).

But with a judicial order to adopt a full value base a likely possibility at any time now, it is appropriate to speculate about the impact of the change. Our data, as we have said, is good enough for this broad purpose. Moreover, we have identified in the course of our study a number of areas that require further investigation, and suggest how this research might be pursued. Moreover, we have not come to grips with the many "practical" problems full value assessment would raise, such as what to do about rent-controlled residences, the possibility that Boston might (as has happened in some other jurisdictions after revaluation) experience a reduction in state aid, etc.

Redistribution is the focus of our study. Total revenue from the property tax is taken as given (at its 1972 level) and the changes in the shares of this total that fall on different types of property are explored. These changes are the essence of the conflict of interests whose uneasy resolution is the prime objective of tax policy. In fact the estimates in our study can be viewed as more useful for political discussion than for economic analysis. Estimates of the sort we have made are the raw materials from which political debate is fashioned. They belong in the political arena because they constitute the balance sheet of who would lose and who would gain on the first round. The taxpayer is keenly interested in what his new tax bill will be.

The longer-run results are less obvious, more difficult to delineate and discuss. The estimates in this study although serving as the basis of the political debate would, at best, have a short span of relevance. For with change in property tax liabilities, not to mention the continuous change brought about in the dynamics of the real estate market itself, would come changes in market values; hence a further redistribution of the

property tax burden. What these changes would amount to and how the process would work out over time are complex matters and are touched upon in Appendix I. It appears that in the longer run tax liability and market value changes would be more moderate than the more immediate effects that our report concentrates on.

The principal finding of our study is that had a shift to 100% assessment, sometimes also called 100% valuation or full value assessment, been made in 1972, the amount of property tax paid on residential property would have been about 20% higher on the average, while the tax paid on business property would have been about 19% lower on the average. Of course the averages mask the enormous differentials or inequalities that exist from property to property in respect to how far the assessed value of each differs from its market value. Thus, not all residential properties would pay more tax; many would pay less. Similarly, business property now benefiting from tax concessions or otherwise caused low assessments would pay more tax, not less.

Part II provides the tables of data and descriptions of our major findings, together with some discussion of policy implications. Part III, by explaining our methods of estimating market values and of deriving certain assessed values, makes clear how much more work needs to be done to obtain market values reliable enough for general revaluation. Part IV focusses on what the Mayor can do. While the public through its lawsuits[1]

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[1] Not only are there the numerous abatement suits by individual taxpayers, but there is also pending the suit by the Town of Sudbury v. Metaxas, which would compel the State Department of Corporations and Taxation to bring about 100% valuation in the cities and towns over which the Department has jurisdiction.

and the political process can always bring about needed changes itself, the city administration could move much faster than it has in implementing recommended improvements in property tax administration and in complying with state law. How refreshing it would be to find at least one great American city facing up to the property tax inequality problem head on!

II. MAJOR FINDINGS AND THEIR POLICY IMPLICATIONS

The points set forth in this section rely on the estimates in Tables I-IV, presented on the following pages, to which the reader should refer for further detail.

1. As of the end of 1972, the market value of taxable real property in the city of Boston was $4,653 million. Slightly more than half (53%) was accounted for by residential property--$2,456 million in all. Commercial property made up most of the rest--$1,975 million (42% of the total), with "other" (primarily vacant land) accounting for the remaining 5%.

2. While ostensibly required to assess for property tax at market value, the city of Boston (and most other local governments in the U.S. as well), whether by default or design, does not achieve this objective. Assessed value is lower than market value and, more importantly, is distributed in different proportions among categories of property than is market value. We estimate the aggregate assessed value of taxable real property at $1,510 million, and note, by way of comparison that this is close to the official figure of $1,532 million tabulated by the city Assessor's office from the tax rolls. Our concern is primarily with the proportions of this total accounted for by the various categories of property since this, in turn, determines each category's share of the property tax. As with market value, residential and commercial together account for all but a small percentage (3.4) of the total assessed value. But their relative importance is reversed. Residential makes up 44 per cent of the tax base; commercial accounts for 53 per cent.

3. Therefore, were the city of Boston to assess all taxable properties at full market value and raise an amount of property tax revenue equal to what was collected in 1972 ($306.4 million), a significant redistribution

TABLE I

ESTIMATED VALUE OF TAXABLE REAL PROPERTY - BOSTON - 1972
(Dollars in Millions)

PROPERTY CATEGORY	CURRENT ASSESSED VALUE Amount	CURRENT ASSESSED VALUE % of Total	MARKET VALUE Amount	MARKET VALUE % of Total
OFFICE:				
NEW	$ 67	4.44%	$374	8.04%
OLD	193	12.78	371	7.97
TOTAL	260	17.22	745	16.01
RETAIL:				
NEW	31	2.05	170	3.65
OLD	175	11.59	337	7.24
TOTAL	206	13.64	507	10.84
HOTEL:				
NEW	8	.53	45	.97
OLD	31	2.05	60	1.29
TOTAL	39	2.58	105	2.26
MANUFACTURING:				
NEW	9	.60	29	.62
OLD	171	11.32	329	7.07
TOTAL	180	11.92	358	7.69
WAREHOUSING:				
NEW	6	.40	43	.92
OLD	53	3.51	102	2.19
TOTAL	59	3.91	145	3.11
PERSONAL SERVICES:				
NEW	6	.40	35	.75
OLD	36	2.38	70	1.50
TOTAL	42	2.78	105	2.25
UTILITIES AND TRANSPORTATION (TABULATED WITH OLD)	10	.66	10	.21
ALL COMMERCIAL:				
NEW	127	8.41	696	14.96
OLD	669	44.30	1,279	27.49
TOTAL	796	52.71	1,975	42.45
RESIDENTIAL	663	43.91	2,456	52.78
OTHER	51	3.38	222	4.77
ALL TAXABLE PROPERTY	1,510	100.00	4,653	100.00

TABLE II

REAL PROPERTY TAX LIABILITY BY CATEGORY OF PROPERTY, UNDER CURRENT ASSESSMENTS AND SIX ALTERNATIVES - BOSTON, 1972 (MILLIONS)

PERTY CATEGORY	CURRENT ASSESSMENTS	MARKET VALUE	NEW COMMERCIAL FREEZE	50% ADJUSTMENT NEW COMMERCIAL	50% ADJUSTMENT ALL PROPERTY	50% ADJUSTMENT RESIDENTIAL	RESIDENTIAL FREEZE
MERCIAL							
FFICE:							
NEW	$ 13.60	$ 24.63	$ 13.60	$ 19.12	$ 21.97	$ 26.94	$ 29.26
OLD	39.16	24.42	26.31	25.37	28.04	26.73	29.02
TOTAL	52.76	49.05	39.91	44.49	50.01	53.67	58.28
ETAIL							
NEW	6.28	11.18	6.28	8.73	10.04	12.25	13.30
OLD	35.51	22.18	23.90	23.04	25.45	24.28	26.36
TOTAL	41.79	33.36	30.18	31.77	35.49	36.53	39.66
OTEL							
NEW	1.62	2.97	1.62	2.30	2.68	3.24	3.52
OLD	6.28	3.95	4.26	4.10	4.57	4.32	4.69
TOTAL	7.90	6.92	5.88	6.40	7.25	7.56	8.21
ANUFACTURE:							
NEW	1.84	1.90	1.84	1.87	1.89	2.09	2.27
OLD	34.68	21.66	23.33	22.50	24.85	23.70	25.74
TOTAL	36.52	23.56	25.17	24.37	26.74	25.79	28.01
AREHOUSE:							
NEW	1.23	2.82	1.23	2.03	2.44	3.10	3.36
OLD	10.75	6.71	7.23	6.97	7.70	7.35	7.98
TOTAL	11.98	9.53	8.46	9.00	10.14	10.45	11.34
ERSONAL SERVICES:							
NEW	1.23	2.30	1.23	1.77	2.04	2.52	2.74
OLD	7.29	4.60	4.96	4.79	5.27	5.04	5.48
TOTAL	8.52	6.89	6.19	6.56	7.31	7.56	8.22
TILITIES AND TRANSPORT a/	2.02	.64	.71	.68	.99	.72	.78
COMMERCIAL							
NEW	25.77	45.84	25.77	35.81	40.96	50.14	54.44
OLD	135.74	84.23	90.71	87.46	96.83	92.14	100.05
TOTAL	161.50	130.07	116.48	123.27	137.79	142.28	154.49
IDENTIAL	134.54	161.72	174.18	167.95	155.09	148.13	134.54
ER	10.36	14.61	15.74	15.18	13.52	15.99	17.37
TAXABLE PROPERTY	306.40	306.40	306.40	306.40	306.40	306.40	306.40

Tabulated with "old".

TABLE III

EFFECTIVE RATES OF PROPERTY TAX [a/] ON SPECIFIED CATEGORIES OF REAL PROPERTY, UNDER CURRENT ASSESSMENTS AND SIX ALTERNATIVE BASES - BOSTON, 1972

TEGORY	CURRENT ASSESSED VALUE	MARKET VALUE	NEW COMMERCIAL FREEZE	50% ADJUSTMENT NEW COMMERCIAL	50% ADJUSTMENT ALL PROPERTY	50% ADJUSTMENT RESIDENTIAL	RESIDENTIAL FREEZE
ICE:							
EW	3.6%	6.6%	3.6%	5.1%	5.9%	7.2%	7.8%
LD	10.6	6.6	7.1	6.8	7.6	7.2	7.8
OTAL	7.1	6.6	5.4	6.0	6.7	7.2	7.8
AIL:							
EW	3.7	6.6	3.7	5.1	5.9	7.2	7.8
LD	10.5	6.6	7.1	6.8	7.6	7.2	7.8
OTAL	8.2	6.6	6.0	6.3	7.0	7.2	7.8
EL:							
EW	3.6	6.6	3.6	5.1	6.0	7.2	7.8
LD	10.5	6.6	7.1	6.8	7.6	7.2	7.8
OTAL	7.5	6.6	5.6	6.1	6.9	7.2	7.8
UFACTURING:							
EW	6.3	6.6	6.3	6.4	6.5	7.2	7.8
LD	10.5	6.6	7.1	6.8	7.6	7.2	7.8
OTAL	10.2	6.6	7.0	6.8	7.5	7.2	7.8
EHOUSING:							
EW	2.9	6.6	2.9	4.7	5.7	7.2	7.8
LD	10.5	6.6	7.1	6.8	7.5	7.2	7.8
OTAL	8.3	6.6	5.8	6.2	7.0	7.2	7.8
SONAL SERVICES:							
EW	3.5	6.6	3.5	5.1	5.8	7.2	7.8
LD	10.4	6.6	7.1	6.8	7.5	7.2	7.8
OTAL	8.1	6.6	5.9	6.2	7.0	7.2	7.8
LITIES AND TRANSPORT [b/]	20.2	6.6	7.1	6.8	9.9	7.2	7.8
COMMERCIAL:							
EW	3.7	6.6	3.7	5.1	5.9	7.2	7.8
LD	10.6	6.6	7.1	6.8	7.6	7.2	7.8
OTAL	8.2	6.6	5.9	6.2	7.0	7.2	7.8
IDENTIAL	5.5	6.6	7.1	6.8	6.3	6.0	5.5
ER	4.7	6.6	7.1	6.8	6.1	7.2	7.8
TAXABLE PROPERTY	6.6	6.6	6.6	6.6	6.6	6.6	6.6

Property tax as a per cent of estimated market value.

Tabulated with "old".

TABLE IV

PERCENTAGE DIFFERENCE IN PROPERTY TAX BURDEN OF SPECIFIED CATEGORIES OF REAL PROPERTY UNDER SIX ALTERNATIVE BASES COMPARED WITH CURRENT TAX - BOSTON, 1972

CATEGORY	MARKET VALUE	NEW COMMERCIAL FREEZE	50% ADJUSTMENT NEW COMMERCIAL	50% ADJUSTMENT ALL PROPERTY	50% ADJUSTMENT RESIDENTIAL	RESIDENTIAL FREEZE
OFFICE:						
NEW	+81%	0%	+41%	+62%	+98%	+115%
OLD	-38	-33	-35	-25	-32	-26
TOTAL	-7	-24	-16	-5	+2	+10
RETAIL:						
NEW	+78	0	+39	+60	+95	+112
OLD	-38	-33	-35	-28	-32	-26
TOTAL	-20	-28	-24	-15	-13	-5
HOTEL:						
NEW	+83	0	+42	+65	+100	+117
OLD	-37	-32	-35	-27	-31	-25
TOTAL	-12	-26	-19	-8	-4	+3
MANUFACTURING:						
NEW	+3	0	+2	+3	+14	+23
OLD	-38	-33	-35	-28	-32	-26
TOTAL	-35	-31	-33	-27	-29	-23
WAREHOUSING:						
NEW	+129	0	+65	+98	+152	+173
OLD	-38	-33	-35	-28	-32	-26
TOTAL	-20	-29	-25	-15	-13	-5
PERSONAL SERVICES (SNIOS)						
NEW	+87	0	+44	+66	+105	+123
OLD	-37	-32	-34	-28	-31	-25
TOTAL	-19	-27	-23	-14	-11	-4
UTILITIES AND TRANSPORT [a]	-68	-65	-66	-51	-64	-61
ALL COMMERCIAL:						
NEW	+78	0	+39	+59	+95	+111
OLD	-38	-33	-36	-29	-32	-26
TOTAL	-19	-28	-24	-15	-12	-4
RESIDENTIAL	+20	+29	+25	+15	+10	0
OTHER	+41	+52	+47	+31	+54	+68
ALL TAXABLE PROPERTY	0	0	0	0	0	0

[a] Tabulated with "old".

of tax liabilities could be expected. Business in the aggregate would pay less, and residences would pay more. Total property tax collected from residential property would increase from $135 to $162 million, or by 20 per cent; commercial property, on the other hand, would enjoy a decline of 19 per cent in the property tax it was responsible for, i.e. a fall from $161 million to $130 million. Under full market value assessment, of course, the effective rate of real property tax would be the same for all properties--6.6 per cent. For residential property this would be a substantial rise over the present effective rate of 5.5 per cent, while for commercial property 6.6 per cent would mean a rate considerably less than 8.2 per cent currently levied on it.

4. The market values and new distribution of tax liabilities set forth in paragraphs 1, 2, and 3 above are "initial" data and results which do not take into account the effects of increases and decreases of taxes on the market values of the properties affected. To the extent that commercial property enjoys a decline in tax liability, its value will rise, while to the extent that residential property suffers an increase in property tax, it would command less in the market. Property values (and, along with them, of course, tax liabilities) would adjust to the initial redistribution of tax liabilities and might, in fact, adjust in anticipation thereof. Therefore, a major consequence, if not the major consequence, of adoption of full-market-value assessment--a major revaluation of properties involving significant windfall gains and losses--is not captured in our estimates in Tables I-IV.[1] But it is important to note here that current

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[1] An effort to estimate the results after values have stabilized appears in Appendix I -- "Steady State Values".

holders of properties would enjoy and suffer these gains and losses. Later holders would through "tax capitalization" have bought "free" of these tax changes.[1]

5. The findings cited to this point are based on averages for very broad classifications of property. These are the basic data of our report, but it would be unduly remiss on our part to fail to note that a wide diversity of experience for individual properties is subsumed in these averages. Thus it is trite but true that about half of the individual properties in each category would experience smaller proportionate tax increases than average and half would have larger than average increases. In fact the dispersions could conceivably be so large as to show a sizeable number of properties having a tax increase when the average result was a decrease, and vice versa. Some of the tax redistributions within categories will be larger than the redistribution, on average, between categories. This matter we have not studied in any depth.

6. For commercial properties, however, we can give a sense of the within-a-category dispersion in two ways: one on the basis of averages for subgroups of commercial properties; the other on the basis of inferences about the dispersion of tax burden redistribution variation drawn from the standard deviations of the assessment-sales ratios developed in the course of our study.

7. A different burden of real property tax presently falls on "new" (built since 1960) and "old" (constructed prior to 1960) commercial property, as summarized in Tables II, III and IV. Commercial properties built since

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[1] For an explanation of tax capitalization, see R.A. Musgrave and P.B. Musgrave, Public Finance in Theory and Practice 414 (1973).

1960 (hereinafter referred to as "new") have generally been assessed under agreement with the city at values presumed to be low enough to permit earning a rate of return sufficient to induce the developers to undertake the project. As a consequence such properties--primarily office and retail--are currently bearing a tax of between 3 and 4 per cent of market values (with the minor exception of "new" manufacturing). "Old" property, however, we estimate pays a tax equal to 10 to 11 per cent of its market value. With full value as the tax base and all property uniformly levied on at 6.6 per cent of market value, "new" commercial will have a tax increase of 78 per cent, while "old" commercial properties would enjoy a tax cut of 38 per cent, very large shifts in tax liability, indeed.

8. Again we note that the figures show the average experience for properties in these respective categories. Within each category, a good number of individual properties would have even more startling changes in tax burden. Suggestive of this result is the high standard deviation of the Assessment-Sales Ratio (ASR) for "old" commercial properties. The unweighted ASR[1] was .47 and its standard deviation, .26. What this means more particularly is brought out by the frequency array of individual ASR's for the 189 properties in the sample.

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[1] Not, by the way, the one employed in our estimate (we used a weighted average), but suggestive of the degree of variation involved nonetheless.

Value of ASR	Number of Properties	Per cent of Total Properties
0 through .10	2	1.1%
.10-.20	17	9.0
.20-.30	38	20.1
.30-.40	34	18.0
.40-.50	29	15.3
.50-.60	19	10.1
.60-.70	18	9.5
.70-.80	10	5.3
.80-.90	11	5.8
.90-1.00	1	0.5
1.00 and over	10	5.3
Total	189	100.0

An average "old" commercial property, i.e., one currently assessed at about 52% of market value, would enjoy a decline in property tax of 38 per cent if full market value replaced current assessments as the basis for the tax. With reference to the frequency distribution, about 15 per cent of properties (those in ASR class .4-.5) would, in fact, experience a decline of this order of magnitude. Thirty-seven per cent (those in ASR classes .5 and above) would have a decline in tax liability proportionately greater than 37 per cent; some 15 per cent of old commercial properties could well have their liability cut by 50 per cent or more. Similarly about 48 per cent of old commercial properties (those with ASR's under .4) would find their tax liability under market value assessment declining less than 37 per cent. In fact, those in the lowest three ASR classes (with ratios of .3 or less) would find that their property tax has gone up.

9. As for taxable residential property it is also important to recognize the wide dispersion of individual outcomes around our estimated "average" experience - an increase in effective rate of 20 per cent from 5.5% to 6.6%. While the variability around the average has not been a major concern of our study (but should be in future extensions of it), we can suggest some of the relevant orders of magnitude by drawing on some recent (as yet unpublished) work of Professor Robert Engle.

He has estimated Assessment-Sales Ratios (ASR's) for taxable residential properties in the 15 Planning Districts by which the BRA divides the City. Giving equal weight to each ASR, we have converted them to relatives of the average, and used these values to estimate the current effective rate on market value in each Planning District and the increase in effective rates they would experience in going to a uniform 6.6 per cent for all Planning Districts (indeed for all classes of property in the City) under full value assessment.

The data, procedures, and results we summarized in Table V. For the 15 Planning Districts the change in tax liability (and tax rate) would vary tremendously in importance. Under the aggregate average increase of 20 per cent for taxable residential properties in the City lie such disparate results as a 27 per cent decrease on average for homes in Washington Park/ Model Cities and an 126 per cent average increase for Charlestown. The changes may be summarized as follows.

Tax Rate Change on Full Value Assessment	Number of Planning Districts	Per Cent of Total
Decline	2	13%
Increase of Under 10%	2	13
Increase of 10% and Under 20%	2	13
Increase of 20% and Under 30%	1	7
Increase of 30% and Under 50%	3	20
Increase of 50% and Under 100%	4	27
Increase of 100% and Over	1	7

TABLE V

ESTIMATED PERCENTAGE CHANGE IN PROPERTY TAX LIABILITY UNDER MARKET VALUE ASSESSMENTS FOR THE "AVERAGE" RESIDENTIAL PROPERTY IN EACH BRA PLANNING DISTRICT - BOSTON, 1972

(1) BRA PLANNING DISTRICT	(2) PER CENT OF TOTAL RESIDENTIAL ASSESSED VALUE	(3) ESTIMATED CURRENT TAX LIABILITY a/ (MILLIONS)	(4) PER CENT OF TOTAL RESIDENTIAL MARKET VALUE	(5) ESTIMATED TAX LIABILITY UNDER MARKET VALUE b/ (MILLIONS)	(6) PERCENTAGE INCREASE IN TAX LIABILITY UNDER MARKET VALUE ASSESSMENT c/
EAST BOSTON (1)	4.10%	$5.52	4.16%	$6.73	+21.9%
CHARLESTOWN (2)	0.86	1.16	1.62	2.62	+125.9
SOUTH BOSTON (3)	2.96	3.98	3.72	6.02	+51.3
CENTRAL/NORTH (4)	4.61	6.20	5.67	9.17	+47.9
BACK BAY/BEACON HILL (5)	13.54	18.22	10.58	17.11	-6.1
SOUTH END (6)	2.19	2.95	3.09	5.00	+69.5
FENWAY/KENMORE (7)	9.35	12.58	8.41	13.60	+8.1
ALLSTON/BRIGHTON (8)	11.12	14.96	13.30	21.51	+43.8
JAMAICA PLAIN/PARKER HILL (9)	6.69	9.00	5.58	9.02	+0.2
WASHINGTON PARK/MODEL CITY (10)	9.61	12.93	5.83	9.43	-27.1
NORTH AND SOUTH DORCHESTER (11)	10.83	14.57	10.12	16.37	+12.4
ROSLINDALE (12)	5.72	7.70	6.58	10.64	+38.2
WEST ROXBURY (13)	7.63	10.27	9.61	15.54	+51.3
HYDE PARK (14)	5.24	7.05	6.60	10.67	+51.3
MATTAPAN/FRANKLIN (15)	5.55	7.47	5.13	8.30	+11.1
TOTAL	100.00	134.54	100.00	161.72	+20.2

Source: Estimates prepared by Professor Robert Engle for Boston Redevelopment Authority, unpublished /dated, December, 1972. In the calculations we assumed that the value of tax-exempt residential property, excluded from our estimates, was distributed among BRA Planning Districts proportionately to the value of all residential property.

a/ Column (3) equals Column (2) × $134.54 million.
b/ Column (4) equals Column (4) × $161.72 million.
c/ Column (6) equals: [(Column (5) - Column (3))/Column (3)] · 100.

At the one extreme, in two districts the average homeowner would have a decline in property tax under full value assessment, in one there would be virtually no change, and in another a modest increase of 8 per cent. At the upper end, in one district the average homeowner's tax would go up by well over 100 per cent, and in three others by over 50 per cent. Remember, moreover, that the diversity is still greater than suggested by the estimates in Table V. For everyone of the entries in Column (6) is itself an average - in this case for a Planning District - around which the experience of individual properties will show great dispersion.

In addition to regional variation within the City, ASR's also vary systematically by category of residential property - tending to rise with size (the number of families housed in the property), and, within a given category, tending to fall with value. If we assume in both these connections that the relative ranking of ASR's was the same in 1972 (the year we are interested in) as in 1962 (the year for which we have relevant data), we can cite evidence suggestive of the extent of dispersions in tax liability changes that would accompany full-value assessments with respect to type of residence and value.

As summarized in Table VI, ASR's vary systematically with class of residence. Typically the smaller the house, i.e., the fewer the number of families housed in it, the lower the ASR and, therefore, the greater the expected property tax increase under full-value assessment. The average tax increase for single and two family houses would be the most pronounced; the tax change for apartments the most modest relatively. We lack the underlying control total necessary for estimating more precise percentage changes, so we cannot say whether the average apartment house will experience a modest

TABLE VI

Data Illustrating the Diversity of Assessment-Sales Ratios for Residential Property in Boston

(1) Type of Residential Property	(2) ASR (1962)[1]
Single Family - One Structure	.341
Two Family or Apartments	.412
Three to Five Families or Apartments	.520
Six or More Families or Apartments	.579
Multi-Family, More Than One Structure	.650

Source: Oliver Oldman and Henry Aaron, "Assessment-Sales Ratios Under the Boston Property Tax", National Tax Journal, March, 1965, p. 40.

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[1] All of Boston for each type of property, excluding questionable sales.

tax increase or an actual decline. Since there is dispersion within any category, however, we can conjecture with some certainty, that a good number of apartment houses would enjoy a decline in tax, and many others a modest increase at worst; while very few single or two family residences could expect such an outcome.

In Table VII we carry the dispersion story one step further - this time with respect to price ranges within given types of residential property. The ASR's have a characteristic behavior for each category of residential property. They are highest for the least expensive properties, which suggests that these modest properties would experience, on average, a smaller proportionate property tax increase, or, in some cases, recognizing dispersion for individual properties within each price range, a more pronounced decline in property tax, if Boston went over to market value assessments. The selling prices are as of 1962; ten years later, 1972, house prices were much higher. The classes in Table VII, then, should be interpreted as "low", "medium" and "high", rather than as absolute numbers. Compared to the over-all average, "low" price houses, as we have said, would experience a less vigorous increase than average in tax liability under full-value assessment. "Medium" and "high" price houses however, now relatively under-assessed, would experience a higher than average tax increase. Again we note that these results are averages for each price class. With considerable additional dispersion to be expected within each class around its average, a number of "low" price homes might well enjoy a cut in taxes. For "medium" and "high" price houses this would be a very infrequent result.

TABLE VII

Data Illustrating the Diversity of Assessment-Sales Ratios Arrayed by Selling Price, Boston (1962)

(1) Price Range	(2) Single Family - One	(3) Two Families or Apartments	(4) Three to Five Families or Apartments	(5) Six or More Families or Apartments
Under $5,000	.603	.887	.880	-
5,000 and Under 10,000	.437	.523	.606	.928
10,000 and Under 20,000	.312	.380	.478	.709
20,000 and Under 35,000	.320	.343	.387	.562
35,000 and Under 50,000	.345	.361	.419	.565
50,000 and Under 100,000	.371	.327	.369	.476
100,000 and Under 250,000	-	-	-	.548
250,000 and Under 1,000,000	-	-	-	.476

Source: Oliver Oldman and Henry Aaron, "Assessment-Sales Ratios Under the Boston Property Tax," National Tax Journal, March, 1965, p. 44.

10. The estimates of the last several paragraphs suggest that multi-family residences, particularly apartment houses, would experience a very modest tax increase under full-value assessment (a good many of them in all likelihood might receive reductions in tax) while single family houses in, say, the West Roxbury-Hyde Park area would be subject to sharply increased burdens. The existing dispersion of effective rates may reflect quite closely, by broad classes of property and regions of the city, the political effectiveness of taxpayers and their attitude toward the property tax. If tenants as a whole do not think they bear much of the property tax and have no particular sympathy for relieving the tax burden on landlords and, if some of the recent speculation about the incidence of the property tax is correct in stating that the tenants are at least in part right in their intuition, then the case for a substantial reduction in the burdens on apartment houses may be difficult to make.[1] Conversely, the owners of single family homes in the West Roxbury-Hyde Park area constitute an important group of voters who would be reluctant to lose the benefit from the city's practice of only rarely raising assessments even in areas of rising property values, and are not particularly concerned that other taxpayers not so favorably situated bear the burdens not borne by West Roxbury - Hyde Park.

11. If one looks at the city public as a whole, from the point of view of who gains and who loses, an important advantage of going to 100% valuation is public awareness of the policy and the possible assistance of

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[1] For surveys of references to literature on recent property tax incidence studies, see Helen Ladd, "The Role of the Property Tax: A Reassessment", in R.A. Musgrave (Ed.), Broad-Based Taxes (Johns Hopkins Press, 1973), and Dick Netzer, "The Incidence of the Property Tax Revisited", 26 National Tax Journal 515-535 (December, 1973).

the public in policing it. At present the lack of public awareness of assessment policy or of changes in it makes it easy for the city to engage in one or another kind of tax deal. The situation is ripe for abuse and the entrenchment of existing differentials and distortions. One device that may be found useful to the city to assist in the policing of the 100% valuation policy (or any other publicly announced, legal policy) is the one used in Wisconsin, perhaps in some other states, and in New Zealand. Under this device a statute would enable two or three taxpayers to petition the local administration (and if no action, the State Tax Commission) to revalue a property which the petitioners think is under-assessed. Since assessment records are public already, the comparisons of assessments by taxpayers would provide a useful general check which would identify flagrant under-assessment.

12. While group averages, then, by no means tell the whole of the story, they are sufficient data for suggesting that there may well be political obstacles in the way of complete and immediate implementation of the legally required full-value assessment. An indicated average increase in property tax on residences of 20 per cent, an average decline of property tax of 38 per cent for "old" commercial properties, and a rise on average of 78 per cent for "new" commercial properties may simply be too severe a change to be implemented in full. Moreover, it could be that even if the political will to effectuate such a change existed, the moral force behind agreements made by the city with property owners may preclude instantaneous and complete application of full valuation to "new" commercial properties, even though the agreements may be without legal force. In recognition of these considerations, we have analyzed the redistributive consequences of

five alternative courses of action between doing nothing and going to 100% valuation for all.

13. If it should turn out that the City of Boston is, in effect, committed by its contractual arrangements to a "freeze" on "new" commercial property, the portion of the total property tax load borne by other categories of property would, perforce, be higher than if the "new" commercial were also to be assessed at full value. Residential property would, on average, bear a tax 29 per cent higher than at present rather than 20% higher, while "old" commercial properties would experience a more modest decline, albeit of about one-third, compared to the 38% decline under full-value assessment for all properties. Obviously, a Mayor caught between a judicial directive to tax uniformly at full market value and a "new" commercial "freeze" would be in the unenviable position of having to adjust property tax liabilities so homeowners and renters (all voters) experienced a 29 per cent rise in property tax on average, while the property tax of "new" commercial properties was unchanged, and the load on "old" commercial properties fell by a third.

14. Under such pressure, the Mayor might well decide (if the law gave him some scope) that while he would have to show special solicitude for those properties with tax compacts, he could not afford not to raise somewhat the tax due from them. He might, for example, as regards "new" commercial property make half of the adjustment called for by the principle of full value assessment. However, our estimates suggest there is not much political nourishment in such a policy. It is true that homeowners would have a smaller tax increase than under the "new" commercial "freeze", but an average increase of 25 per cent over present levels could still be considered "crushing". Moreover, if it is true that the compacts were

necessary at the margin of choice to get new development to locate in Boston and not elsewhere, a 39 per cent increase (on average) in the tax that would otherwise be due from a newly constructed commercial project might significantly curtail new construction. "Old" commercial properties would, of course, enjoy a 36 per cent (on average) decline in property tax, but it is doubtful that the gratitude from this sector would go far toward placating irate homeowners, or relieving those concerned with the possible decline in new commercial construction.

15. The Mayor then might consider a compromise that affected all categories of taxable property "equally". One possibility would be to move half-way toward full value from present assessments and tax accordingly. Residential property currently relatively more underassessed (compared with the market value benchmark) would, of course, have to pay more than at present under this alternative, too. But the average experience would be less of a jolt than in the various policies discussed in the several preceding paragraphs. On average the property tax of residential properties would increase by 15 per cent, "old" commercial properties would enjoy a 29 per cent decline in property tax, while "new" commercial properties would find their property tax up by more than 50 per cent. Homeowners would howl less than under the other alternatives reviewed up to this point, but commercial developers could well find a 59 per cent increase in taxes definitely discouraging.

16. Even more concern could be shown for the homeowner. Illustrative of these possibilities is a policy of adjusting residential properties in part to the new basis--the example we chose involved making half the adjustment called for--and making up the rest of the required tax revenue

from the commercial sector. The tax increase experienced on average by residential properties under this arrangement would be quite modest, about 10 per cent. "Old" commercial properties would, nonetheless, enjoy a 32 per cent cut in property tax payments, but "new" commercial properties would find their tax increased by 95 per cent on average. The Mayor with this policy would be keeping the unhappiness of homeowners to a relatively modest level, but he would also be severely discouraging new commercial development.

17. Of course freezing the tax due from residences would be even more popular with homeowners. And it would, on average, permit a slight fall in the tax on commercial properties (at the expense of "other" property) as compared with liabilities under current assessments. But within the commercial sector, "new" properties would experience, on average, more than a doubling of tax due, while "old" properties would find the property tax about 26 per cent lighter.

18. All these policies reflect the conflicting pressures operating on the Mayor in going from the current assessments to full value assessment. That step would raise taxes on residences by more than a fifth and on "new" commercial properties by nearly 80 per cent. Thus he would feel the wrath of voters (homeowners and renters) and face the prospect of a sharp curtailment of property development in the city. To the extent that he attempted to mollify the former, he would accentuate the latter, and vice versa. Of course this is no new discovery. It is simply the specific property tax version of the iron law of politics. To the extent that the size of the pie is fixed, you can only give more of it to A at the expense of less to B.

19. While these reflections are based primarily on the average results, they would be substantially modified if we were to take account of the diversity around the average. Some modest efforts in this connection are reported above; the results whet our appetites for more extensive work in this connection. Certainly that task is high on our list of further work to be done. Nonetheless, the inferences possible now without further extensive study suggest that taking account of the diversity of experience will illuminate still more difficult areas of trade-off. Thus in moving to full value assessment, we think it likely that a number of residences in Roxbury could still receive a tax cut, since the divergence (in an upward direction) of their assessment from the residential average is greater than that sector's divergence (downward) from the average for all properties. But, at the same time, political benefits from this prospect might be nullified by the large increase in tax liability on the homeowners in the "good" sections of the City.

III. EXPLANATION OF METHODS USED IN DERIVING MARKET VALUES AND CURRENT ASSESSED VALUES FOR TAXABLE REAL PROPERTY, OF 1972, IN BOSTON.

Market Value

Introduction

In this section we furnish detail on the data, assumptions, and methods employed in deriving estimates of market value and assessed value for taxable real property, by type category, in the city of Boston as of the end of 1972.

First, as summarized in Table A and elaborated more fully in the notes that follow the Table, we take up the estimates of market value for most categories of taxable commercial real property, for which a common methodology was used. Then we explain the remainder of the market value estimates. Finally, we outline in Table B and the notes which follow it the sources of the assessment-sales ratios which, together with the estimated market values, furnished the estimates of assessed value.

Since 1960, we take it, most of the commercial real property built in the city of Boston has been covered by agreements between the developers and the city which set the property tax liability at a specified fraction of gross income from the property with the result that assessed values and effective rates of tax run lower than those that apply to commercial properties of earlier vintage. Therefore, we developed separate estimates for these two categories of taxable commercial real property. In what follows, properties constructed before 1960 will be referred to as "old", while those built from 1960 on will be designated as "new".

While market values are developed separately for "old" and "new" commercial property, similar methods were employed in making the estimates. Market value is derived as the product of a physical amount of property[1] and the per unit cost (construction and land) of reproducing the property. For estimates of the physical amount of property by category - Office, Retail, Hotels, Manufacturing, and Warehousing - we are indebted to the Boston Redevelopment Authority (BRA), and wish to thank Alex Ganz and Susan Houston particularly. Replacement costs (exclusive of land) for the most part came from the Stevens Valuation Quarterly. Land costs (values) were estimated on the basis of typical ratios of land to other costs suggested by Theodore R. Smith of the Harvard Law School International Tax Program. Dr. Smith has cautioned that these ratios are approximations subject to wide margins of error. We thank him for his help and absolve him from blame in our specific use of the information he provided.

By way of summary, then, our basic assumptions in deriving market values of most classes of taxable commercial real property were that the current value of that property is equal to the sum of:

a) the construction costs of replacing the structure (depreciated back to the time of construction, on average)[2] and

b) the value of the land on which the structure stands.

There follows a detailed discussion of data and methods.

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[1] Square feet for all categories but Hotels, for which category the physical unit was number of rooms.

[2] The cost approach to valuation is well recognized in this state and elsewhere, especially with respect to properties which are not obsolete in use or are relatively new. See, for example:

(1) Commonwealth of Massachusetts, Department of Corporations and Taxation, Massachusetts Property Tax Law Handbook 16-19 (1973).
(2) J.C. Bonbright, Valuation of Property, chapter 8, pp. 144-5 (1937).
(3) Seagram v. Tax Com'n, 18 App. Div. 2d 109, 238 N.Y.S. 2d 228 (1963), affirmed 14 N.Y. 2d 314, 251 N.Y.S. 2d 460, 200 N.E. 2d 447.
(4) Matter of 860 Fifth Ave. Corp. v. Tax Com'n, 8 N.Y. 2d 29, 32, 167 N.E. 2d 445, 456 (1960)

TABLE A

ESTIMATION OF MARKET VALUE OF VARIOUS CATEGORIES OF COMMERCIAL REAL PROPERTY - BOSTON, 1972

(1) CATEGORY OF PROPERTY	(2) ESTIMATED PHYSICAL AMOUNT (MILLIONS OF SQUARE FEET)	(3) ESTIMATED REPLACEMENT COST PER SQUARE FOOT	(4) LAND AS PERCENT OF TOTAL VALUE	(5) ESTIMATED LAND VALUE PER SQUARE FOOT	(6) DEPRECIATION FACTOR %	(7) ESTIMATED IMPROVEMENT VALUE PSF	(8) TOTAL VALUE PSF	(9) TOTAL MARKET VALUE IN CATEGORY (MILLIONS)
OFFICE:								
NEW	6.7	$43.18	25	$14.39	4.2	$41.37	$55.76	$374
OLD								
CLASS B	5.3	24.54	25	7.88	25.0	18.41	26.29	139
CLASS C	11.9	18.02	25	6.00	25.0	13.52	19.52	232
TOTAL	23.9							745
RETAILING:								
NEW	3.7	34.56	27	12.78	4.2	33.11	45.89	170
OLD	18.3	16.43	25	6.08	25.0	12.32	18.40	337
TOTAL	22.0							507
HOTELS:								
NEW [c]	1,563 [a]	$30,000 [b]	25	7,500 [b]	4.2	21,555 [b]	29,055 [b]	45
OLD [c]	4,643		25		25.0		13,011	60
TOTAL	6,206							105
MANUFACTURING:								
NEW	1.0	25.16	20	6.04	6.8	22.52	28.56	29
OLD	29.0	11.34	20	2.84	25.0	8.51	11.35	329
TOTAL	30.0							358
WAREHOUSING:								
NEW	2.0	17.04	25	5.63	5.5	16.10	21.73	43
OLD	10.0	9.43	25	3.14	25.0	7.07	10.21	102
TOTAL	12.0							145

NOTES: Col. 5 = [(Col. 3) ÷ (100.0 - Col. 4] - Col. (3)
Col. 7 = Col. (3)·[100.0 - Col. (6)]
Col. 8 = Col. 5 + Col. 7.
Col. 9 = Col. (2) × Col. (8)

[a] Number of rooms.

[b] Per room.

[c] Since in our hotel estimates, column (2)'s costs include land, the estimation of market values is different for this category than for the others in the table.

Sources and Methods for Estimates in Table A

Column 2 - (Unless otherwise specified BRA estimates of physical amounts of construction referred to here are those made available to us as of 10/27/73. These estimates "include only taxable property".)

Office Space - The Boston Redevelopment Authority (BRA) estimates 20.3 million square feet (msf) of rentable office space in Boston as of the end of 1972. Rentable square footage is about 85 per cent of gross square footage. This latter being our basis for estimating market values, we have adjusted BRA's figure to 23.9 million square feet. Similarly, the BRA breakdown of this total of 5.7 million square feet of "new" office buildings and 14.6 msf of "old" was blown up to 6.7 and 17.2 respectively. "Old" office buildings were further subdivided on the basis of quality and age in two categories--"B" and "C". The Ryan, Elliott Real Estate Market Survey, (Boston Office Edition October 1, 1972) divides commercial office buildings (tabulated by number and total office space in square feet) in three classifications--A, B and C--"based upon age and quality of construction and finish" as follows:

Building Class	Total Square Feet of Office Space (Millions)
A	7.3
B	3.6
C	8.1
Total	19.0

While this total is lower than our estimate of 23.9 million square feet as of the end of 1972, we felt the Ryan, Elliott breakdown would be useful for apportioning our total among these age and quality categories. Specifically we assumed category A to be equivalent to "new" construction, the total volume of which we had estimated at 6.7 million square feet of

office space over the period 1960-1972. "Old" office buildings were all assumed to be in categories B and C. We allocated this total square footage of "old" office buildings in the same proportions that B and C each have to B + C in the Ryan, Elliott survey, ending up with estimated amounts of office space in each classification as follows:

Building Class	Total Square Feet of Office Space (Millions)
A	6.7
B	5.3
C	11.9

Retailing - BRA estimates 18.9 million square feet of rentable retail space as of the end of 1972. Again, because we use gross square footage as the basis of our value estimates, we adjusted this upward to 22 msf using the generally applicable ratio of net to gross of .85. While the BRA did not (or, more properly, had not yet) break our "old" and "new" from this total, we did so on the basis of the ratio that they bore in an earlier set of estimates provided by Peter Menconeri of the BRA (which admittedly were closer to judgmental than precise). These earlier estimates had put total retail space at 24 msf, and the "new" component at 4 msf. Hence our division of aggregate retail space into 18.3 msf for "old", and 3.7 msf of "new".

Hotels - BRA estimates

Manufacturing - BRA estimates

Warehousing - BRA estimates

Columns 3-8: Derivation of Replacement Cost Estimates and Market Values

In these columns we lay out the derivation of unit replacement costs, and indicate how, on the basis of these figures, we arrived at estimated market values.

In the explanation that follows, we take up "new" properties (built from 1960 on) first, and then consider "old" properties (built before 1960).

a) Commercial Office Space

The Stevens Valuation Quarterly had a figure of $44.09 as the construction cost per square foot (psf) for "Class A" buildings in the "Excellent" classification as of April 1, 1973 (page B-77 of the Stevens Valuation Quarterly, 4/73). The Fourth Quarter Supplement, October, 1973 (page S-6) indicated that construction costs as of the end of 1972 were 528.6/539.7 of costs as of the end of March, 1973. Therefore, an appropriate figure for the end of 1972 would be $43.18 per square foot (Column 3). But this is exclusive of land. Theodore Reynolds Smith, who has studied land values in central city areas, estimates (with the caveat that it is a rough figure) that land is about 25 per cent of the total value of commercial office properties (Column 4). Therefore, unit land costs should be $14.39 per square foot (Column 5).

High-grade office buildings depreciate slowly, say at about 1 per cent per year, but over a period as long as 12 years (the period covered by "new" construction), even a rate as low as this cannot be overlooked. From Alexander Ganz, "Supply and Demand for Office Space in the Downtown-Back Bay Area of Boston" (an unpublished study of the BRA), we have the following age distribution of "new" office buildings.

Period	Net Increment of Office Space (Millions of Sq. Ft.)	Percentage of Total Net Increment	Depreciation Factor	Weighted Depreciation Factor (%)
1960-4	1.9	17.6	10	1.8
1965-70	5.2	48.1	4.5	2.2
1971 (estimated)	1.9	17.6	1	.2
1972 (estimated)	1.8	16.7	0	0
Total	10.8	100.0		4.2

Therefore we depreciate our "new" office building cost estimates by 4.2 per cent, as shown in Column 6, to get the average current replacement value for all office buildings constructed from 1960 through 1972. Hence the figure of $41.37 per square foot in Column 7. The total replacement cost psf, $55.76 in Column 8, is obtained by adding the original land value psf (Column 5) to the replacement cost psf of buildings (Column 7). Finally, the estimated market value of $374 million in Column 9 is obtained as the product of Columns 2 and 8.

Independently of the estimate just described, Jack Hall of Cabot, Cabot and Forbes had suggested a range of costs for office building construction including land of $45-$60 per square foot. And Stewart Forbes of the BRA, whom we had also consulted, concurred with this order of magnitude. The fact that our final figure of $55.76 per square foot derived as explained above fell within this range was comforting as regards our estimates of the market value of taxable commercial office buildings and also with respect to the use of this same method for other categories of commercial property.

b) Commercial-Retail

Stevens Valuation Quarterly (page B-86) has $35.29 as the cost psf of constructing "Class A--Excellent" stores as of April 1, 1973. This figure is adjusted to $34.56 as explained

earlier in connection with office space to get the end of 1972 cost. For retail establishments Theodore Smith suggests (once again emphasizing the "roughness" of the estimate) that land ranges between about 27% and 33% of total value. The higher end of the range is probably more characteristic of suburban shopping centers. For Boston city, feeling that the lower end of the range is more appropriate, we chose 27%. Thus estimated unit costs psf of land would be $12.78. In the absence of any more precise information on "new" retail construction, we assume the same time pattern prevailed as for office space, and so depreciate this cost by 4.2 per cent, to end up with $33.11 as the appropriate per unit replacement value which becomes $45.89 including land.

c) Commercial-Hotel

Peter Menconeri and Mark Gilman of the BRA suggested a unit cost including land of $25,000-$35,000 per room. We assumed 25 per cent to be land, and using the mid-point of $30,000, obtained a construction cost of $22,500, which we depreciated to $21,555 (using the same 4.2 per cent depreciation factor as for office buildings). Adding back land value of $7,500 per room furnished a current replacement cost of $29,055 per room. The 1,563 "new" hotel rooms, therefore, have an estimated market value of $45 million.

d) Commercial-Manufacturing

Stevens Valuation Quarterly (page B-71) has a psf construction cost for "Class A--Excellent" industrial buildings

of $24.16 for the end of 1972 figure. We assumed land to be 20 per cent of total value, so the psf cost including land was estimated at $30.20. Taking account of depreciation, we lowered this to $28.15 which serves as the figure, applicable on the average, for "new" manufacturing construction since 1960. (The weighted average depreciation rate, 6.8%, was compiled as indicated below based on data made available by the BRA.)

Calendar Year	Manufacturing Construction (Thousands of Sq. Ft.)	Percentage of Total "New" Manufacturing Construction	Annual Depreciation Factor	Weighted Depreciation Factor
1960	---			
61	172.9	18.8	11	2.1
62	65.8	7.2	10	0.7
63	260.0	28.3	9	2.5
64	45.0	5.0	8	---
65	49.0	5.3	7	---
66	223.2	24.3	6	1.5
67	---			
68	---			
69	103.4	11.2	3	---
70	---			
71	---			
TOTAL	919.3	100.0		6.8%

e) Commercial-Warehousing

The $17.40 psf construction cost for "Class A--Excellent" warehouses as of April 1, 1973 (Stevens Valuation Quarterly, page B-88) was adjusted downward to $17.04 (to get a value as of the end of 1972), upward to take account of land costs (estimated to be 25 per cent of total value of project or $5.63 psf), downward to $16.10 to account for depreciation over the period 1960-72. (The weighted average depreciation rate, 5.5%, was computed as indicated below, based on data made available by the BRA.) The sum of depreciated replacement cost (column 7) and land value (column 5) is the estimated value psf (column 8).

Calendar Year	Warehousing Construction (Thousands of Sq. Ft.)	Percentage of Total New Warehousing Construction	Annual Depreciation Factor	Weighted Depreciation Factor
1960	---	---		
61	40.3	2.1	11	0.2
62	300.0	15.3	10	1.5
63	---	---	---	---
64	134.2	6.8	8	0.5
65	71.8	3.7	7	0.3
66	407.4	20.8	6	1.2
67	---	---	---	
68	896.1	45.7	4	1.8
69	44.0	2.2	3	---
1970	67.5	3.4	2	---
71	---	---	---	
TOTAL	1,961.3	100.0		5.5%

Derivation of Estimates of Unit Construction Costs Applicable to "Old" ("Existing") Properties

Estimated construction costs for properties built prior to 1960 were obtained as follows:

a) Commercial-Office Space

As explained above (in the section dealing with estimating the physical amount of property) all "new" construction was assumed to fall in the "Class A--Excellent" category in the Stevens Valuation Quarterly and was valued (costed) at $55.76 psf.

"Old" construction we apportioned among "Class B--Average" and "Class C--Average". For "Class B--Average" we started with the Stevens Valuation Quarterly figure (page B-77) of $25.06 psf and adjusted it downward to $24.54 to reflect construction costs as of the end of 1972 (see explanation under "new" construction for precise ratio used), and adjusted it downward again by one-fourth to $18.41 to take account of depreciation. Finally, assuming once again (as we did for "new"

office buildings) that land is 25 per cent of total value, we obtained a land value of $7.88 psf, and a replacement cost for construction plus land of $26.29. As regards "Class C--Average", we proceeded in a similar fashion. Thus we adjusted the $18.40 psf construction cost downward to $18.02 to get a figure as of the end of 1972, cut it by one-fourth to allow for depreciation, estimated land at $6.00 psf, to end up with a combined psf figure of $19.52.

We need not labor the point that these are highly judgmental estimates. It would take much more in the way of resources and time than we had available to develop more precise values. So we note here a general caution regarding our unit cost figures. Like all puddings the proof of our set of estimates is in the eating: on this score, as explained below, when we evaluate our figures against the known total of taxable assessed values.

b) Commercial-Retail

"Old" retail construction is assumed to be equally divided between "Class B--Average" and "Class C--Average". The Stevens Valuation Quarterly (page B-86) average construction cost psf for these two categories as of April 1, 1973 is $16.78, which when depreciated by one-fourth, becomes $12.32. Finally, taking account of land value, estimated as explained above (see "new" retail construction) to be 27 per cent of the total ($6.08 psf), we have a market value (including land) for "old" retail property of $19.52 psf.

c) Commercial-Hotel

We linked our estimate of current costs (value) per room for "old" hotels to our figure for "new" hotels via the construction cost data of the Stevens Valuation Quarterly (page B-70). Following our usual assumption, "new" construction is taken to be "Class A--Excellent" and, in the absence of any other evidence, "old" construction is considered to be made up of "Class B--Average" and "Class C--Average" in equal proportions. For hotels, "Class A--Excellent" construction cost psf is $36.11 in the Stevens Valuation Quarterly (April 1, 1973). The mean of "Class B--Average" and "Class C--Average" is $21.56, which when depreciated by one-fourth becomes $16.17. The ratio of this figure to $36.11 is .4478. So we assumed the replacement cost (value) per room of "old" hotels was equal to this fraction of the replacement cost (including land) for "new" hotels, i.e. $13,011 (which is .4478 [$29,055]).

d) Commercial-Manufacturing

"Old" manufacturing construction is assumed to be equally divided between "Class B--Average" and "Class C--Average". The Stevens Valuation Quarterly (page B-71) average construction cost psf of these two categories is $11.58, which, adjusted to be as of the end of 1972 becomes $11.34, and depreciated is $8.51. Assuming land to be 20 per cent of total initial value for manufacturing properties, it comes to $2.84 psf, so we end up with a psf including land value for "old" manufacturing properties of $11.35.

e) Commercial-Warehousing

"Old" warehouse properties are assumed to be equally divided between "Class B--Average" and "Class C--Average", the average psf cost of construction for which, as of April 1, 1973 is given in the Stevens Valuation Quarterly (page B-88) as $9.63. Stepping it down to a value as of the end of 1972 gives $9.43; depreciating by one-fourth gives $7.07; and then taking account also of land costs (land is estimated to be 25 per cent of total value for warehouse properties) brings us to $10.21 as the replacement construction cost (including) land psf for "old" warehouse properties.

Commercial - Personal Services Not Included in Office Space (SNIOS)

For one major category of commercial property there is not sufficient information for estimating market values in the manner just described. This category is made up of a vast variety of personal services including: laundries, barber shops, beauty parlors, repairs of all kinds, auto and equipment rentals, motion pictures, amusements and recreation, educational, museums, etc.

To arrive at a figure for the market value of commercial property in this category--hereinafter designated Commercial Personal Services (not included in office space) and abbreviated for convenience to SNIOS--we utilized payroll data, relying on the assumption that in the main the ratio of payrolls to market value of premises is substantially similar across industries, so that this sector's share of payrolls in Boston would be a reasonable proxy for its share of commercial property.

Details of our method follow.

1. Payroll data for Boston for 1972 were obtained from Employment and Wages by Area compiled by the Division of Employment Security, Commonwealth of Massachusetts.

2. SNIOS payroll is assembled from the payroll data for the Standard Industrial Classification (SIC) three digit industries in the 700's and 800's with the following exceptions.

   a. Hotels 701-704, excluded because we had already estimated their market value.

   b. Hospitals - Total excluded since all hospitals are exempt from taxation.

   c. Elementary and secondary schools - The vast mass of payrolls in this category are not included in any event (as secondary and primary school teachers are not covered by unemployment compensation), and the small amount of payroll tabulated is excluded because schools are either public or exempt from tax.

   d. Colleges and Universities, Libraries and Information Centers, Museum and Art Collections, and Botanical and Zoological Gardens - excluded because they are either public or exempt from tax.

   e. Legal Services, Miscellaneous Business Services, Nonprofit Organizations, and Miscellaneous Services - excluded because it is reasonable to hold that they were included in the commercial office space estimates described above.

   f. These exclusions totalled $763.0 million, which is to be subtracted from $926.2 million, the tabulated payroll for all services (SIC Codes in the 700's and 800's). Thus the estimated SNIOS payroll is $163.2.

g. Total covered payrolls in Boston were $3,553.1 in 1972. But a portion of these were associated with public property, and/or tax exempt premises. We estimate them (the categories noted under b., c. and d. above) to come to $356.4 million. Adjusting for this amount reduces total covered payrolls to $3,196.7 million.

h. Finally, the market value of SNIOS is estimated at $163.2/ $3,196.7, or 5.1 per cent of total taxable commercial property. The entries in Table A total $1,860 million, and Utilities and Transportation (See immediately below) add another $10 million. With $1,870 million equal to 94.9 per cent of the total, the aggregate market value of taxable commercial real property would be $1,975 million, and SNIOS, then, is estimated at $105 million as a residual. To allocate this amount between "new" and "old", we used the proportions that applied for retail property - 33.5 per cent "new" and the rest, "old". Hence our estimate of $35 million "new" SNIOS and $70 million old.

Utilities and Transportation

Utilities (electricity, gas, and telephone) hold extensive amounts of property in Boston. But very little of it shows up in the tax rolls in a way that is germane to our study. Most of what utilities own is, apparently, classified as personal property, while two very important transportation facilities are not on the taxable rolls, one being owned by the BRA and the other by the MBTA.

Thus, the five utility companies - American Telephone and Telegraph, New England Telephone, Western Union, Boston Edison and Boston Gas - were assessed on the taxable rolls in 1972 for $7.1 million of real property

(this is the figure relevant for our study) and $154 million of personal property. And with respect to transportation, the Greyhound Terminal was assessed at $1 million, Trailways Terminal at $175 thousand, North Station (difficult to identify in the records) at something like this or less, while South Station, owned by the BRA and Back Bay Station, owned by the MBTA, were, of course, exempt from the property tax.

With identified taxable utility real property real property assessed at around $7 million, and taxable transportation real property assessments on the order of $1.5 million, a total of $10 million for this category seemed reasonable. On the assumption that these properties are assessed by the state at 100 per cent of market value; we estimated both the assessed value and market value of taxable properties in this category as $10 million. In the tabulations, we put all of this category of real property under "old".

Residential - Estimate by Boston Redevelopment Authority (BRA) that appears in Memorandum of April 30, 1973 which explains its derivation of the value of all residential property as follows:

> The total residential figure was developed primarily from a BRA report entitled "The Housing Stock of the City of Boston by Neighborhood". This source, based on 1970 census material, presented the aggregate 1970 market value of all housing for each neighborhood in Boston. Briefly, the market value figures were, for single-family housing, based on capitalization of rents. Capitalization rates were developed for each neighborhood on the basis of information on vacancies, trends of residential sales prices, and family income. To update the 1970 values to 1972, price indices were used. These indices were developed for the same neighborhoods as were presented in "The Housing Stock" and reflected the change in sales prices for all residential property that had been sold at least twice. These indices were applied to each of the neighborhood market value figures for 1970, and, with some modifications for actual changes in the housing stock, the resulting 1972 values were summed to the total figure of $2.602 billion.

But this figure, based on approximately 232,000 dwelling units, includes all taxable and tax exempt residential properties. Taxable properties alone number about 214,000.

Adjusting simply on the proportion of the number of exempt residential units to the total number of dwelling units, i.e., taking $\frac{214,000}{232,000}$ of the total value of $2.6 billion would be inappropriate, since tax exempt housing (primarily public housing) generally has a lower value on average than taxable housing. From a study on subsidized housing by the Boston Urban Observatory ("Reconnaissance Report of the Subsidized Housing Study", 12/31/72) an estimate of $21,000 per subsidized dwelling unit ("new" construction) was obtained, and by Mark Gilman and Robert Earsy of the BRA an order of magnitude cost of $30,000 per dwelling unit for "new" private construction was suggested. Assuming these two figures to indicate the *relative* values of exempt and taxable dwelling units respectively, we lowered $2.6 billion by $(1 - \frac{214,000}{232,000} \cdot \frac{\$21}{\$30}$ to get $2,456 as our estimate of the market value of taxable residential property. (The data on number of housing units used in this estimate are due to the generosity of Susan Houston of the BRA.)

Other - Derived by working backwards from the assessed value estimates of Table 2, and an ASR of .23--the same as that reported in the 1972 Census of Governments[1] for Vacant Platted Land, since Vacant Lots represented virtually the whole of Locally Assessed Taxable Real Property not accounted for by Commercial and Residential in 1966, the most recent year for which such estimates are available.

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[1] U.S. Bureau of the Census, Census of Governments, 1972, *Volume 2, Taxable Property Values and Assessment-Sales Price Ratios, Part 2: Assessment-Sales Price Ratios and Tax Rates, U.S.*, U.S. Government Printing Office, Washington, D.C., 1973, p. 127.

Specifically, in Boston in 1966, Residential and Commercial and Industrial (which combined category we have been referring to as Commercial) made up 96.6 per cent of the total; vacant lots accounted for 3.1 per cent, and what the Census of Governments designated as Other and Unallocable represented 0.3 per cent. Our Other, amounting to 3.4 per cent is the sum of these two latter categories.[1] Having estimated the assessed values for Commercial and Residential as described in notes for Table B, we were able to derive a figure for Other on the assumption that this category represented the same percentage of total assessed value in Boston in 1972 as it did in 1966.

Then, as explained above, we estimated the market value of Other property on the assumption that the assessed value was 23 per cent of market value, to end up with $222 million.

Assessed Values

Introduction

From the market values whose derivation has been explained above, we obtained estimates of assessed value for each category of taxable real property by application of assessment-sales ratios, i.e., ratios assembled from the data of real property sales whose numerator is the assessed value of the property sold and whose denominator is the selling price.

In Table B, we list the assessment-sales ratios used for each category of property, and in the notes that follow the table we explain, in some detail, the source of each.

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[1] For the data, see U.S. Bureau of the Census, Census of Governments, 1967, Volume 2, Taxable Property Values, U.S. Government Printing Office, Washington, D.C., 1968, p. 132.

TABLE B

DERIVATION OF CURRENT ASSESSED VALUE OF REAL PROPERTY FROM ESTIMATED MARKET VALUE - BOSTON, 1972

(1) PROPERTY CATEGORY	(2) ESTIMATED MARKET VALUE (MILLIONS)	(3) ASSESSMENT-SALES RATIO	(4) ESTIMATED ASSESSED VALUE (MILLIONS)
COMMERCIAL			
OFFICE:			
NEW	$374	.18	67
OLD	371	.52	193
TOTAL	745		260
RETAIL:			
NEW	170	.18	31
OLD	337	.52	175
TOTAL	507		206
HOTEL:			
NEW	45	.18	8
OLD	60	.52	31
TOTAL	105		39
MANUFACTURING:			
NEW	29	.32	9
OLD	329	.52	171
TOTAL	358		180
WAREHOUSING:			
NEW	43	.14	6
OLD	102	.52	53
TOTAL	145		59
PERSONAL SERVICES (SNIOS):			
NEW	35	.18	6
OLD	70	.52	36
TOTAL	105		42
UTILITIES AND TRANSPORTATION (TABULATED WITH OLD)	10	1.00	10
ALL COMMERCIAL:			
NEW	696		127
OLD	1,279		669
TOTAL	1,975		796
RESIDENTIAL	2,456	.27	663
OTHER	222	.23	51
ALL TAXABLE PROPERTY	4,653		1,510

Derivation of Assessment-Sales Ratio for "Old" Commercial Properties

For "old" commercial properties we developed an assessment-sales ratio based on sales of commercial properties in 1972. For this purpose commercial was taken to mean all taxable real properties other than residences.

The sample used in deriving the ratio was drawn from a data base consisting of all reported sales of commercial properties in 1972. From the 240 seemingly separate transactions that made up the basic data, 51 were excluded as invalid or inappropriate. The final sample, therefore, contained 189 sales.

Sales with the following characteristics were excluded from the sample. (In parenthesis we show the number excluded for the reason cited.)

1. No sales price or assessed value. (30)
2. It appeared questionable that the sale was "arms-length". If both the seller and buyer had the same family name, for example, we did not consider this exchange valid evidence of market price. (9)
3. The city of Boston or the Boston Redevelopment Authority was a buyer or seller. Such transactions, affected with the public interest, might not be accurate reflections of market price. (3)
4. New or continuing mortgages on the property exceeded the sales price by more than 5 per cent. Banks, not being philanthropic institutions, the sales price appeared to be in error. (2)
5. The assessed value of the property exceeded the listed sales price by 50 per cent. While one would expect some divergence between assessed value and a property's market value, with property owners able to seek relief, an upward divergence this great seems unlikely. (7)

The 189 observations could be combined and averaged in two ways. Calculating the ASR for each property and averaging these ratios gave an un-

weighted ASR of .47. Summing up all assessed values and selling prices furnished a weighted ASR of .52, which is the number that appears in Table B. Since our objective was to go from total market value to total assessed value (and its distribution among the various categories of property), a weighted average is the appropriate one to use.[1]

Commercial - "New" (i.e. built since 1960)

To obtain the equivalent of ASR's for "new" commercial properties, we calculated weighted averages of the ratios of assessed value to development costs for particular properties in each of four categories. For 15 commercial office space buildings the ratio (weighted by development cost, which was assumed equal to market value) was .18; in our sample of thirteen retail properties it was .18; a sample of six manufacturing properties had a ratio of .32, while for nine warehousing facilities it was .14. For "new" hotels we made no survey but used the .18 for an ASR,

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[1] The following simplified example for a world of two properties illustrates why.

Let A_1 and A_2 be the assessed value of the two properties and P_1 and P_2 their selling prices (market value). The unweighted average ASR for this "single" is equal to: $[(A_1/P_1) + (A_2/P_2)]/2$, while the weighted average ASR is: $(A_1 + A_2)/(P_1 + P_2)$. The market value $P_1 + P_2$ having been determined, we are seeking to estimate the assessed value, i.e., $A_1 + A_2$.

Using the weighted ASR, it is indeed true that $\frac{A_1 + A_2}{P_1 + P_2}(P_1 + P_2) = A_1 + A_2$. And it is also the case that the simple average would not estimate $A_1 + A_2$. For $\frac{A_1/P_1 + A_2/P_2}{2} \cdot P_1 + P_2$

is equal to: $\frac{A_1/P_1}{2} \cdot P_1 + P_2 + \frac{A_2/P_2}{2} \cdot P_1 + P_2$

$$= \frac{A_1}{2} + \left(\frac{A_1P_2}{P_1}\right)/2 + \frac{A_2}{2} + \left(\frac{A_2P_1}{P_2}\right)/2$$

And this is not equal to $A_1 + A_2$, except in the special case of $P_1 = P_2$.

since this appeared to be the typical value for "new" commercial properties. And we did the same for SNIOS.

The various samples from which our estimated ASR's were derived are tabulated in the Appendix.

The ASR of 1.00 for Utilities and Transportation, as has been explained above, reflects understanding that the state values such properties at 100 per cent of market. In any event the value of taxable property in this category is very small, so an error in the ASR is inconsequential.

Reliability of data for non-residential property. Because of the wide dispersion of assessment ratios for commercial and other non-residential property and the relative paucity of sales of non-residential as compared to residential property, it could well be that the reliability of our ratios for non-residential property is questionable. While we have attempted to take into account the much lower ratio for new construction during recent years, we were unable to take into account the possibility of "deals" between the city and owners of valuable properties which were not new; nor have we paid any attention to the possibility of parcels omitted from the tax rolls, a point stressed by the Jacobs Company report at page 83; nor have we accounted for the significant number of abatements as well as possible other under-assessments of older non-residential property. A complete study of non-residential property, rather than a sample study such as ours, could possibly bring to light sufficient undertaxed non-residential values to make it unnecessary for any of the tax burden to shift from non-residential to residential property as a result of the change to 100% valuation. At the very least it appears we have omitted some untapped potential value in the commercial sector. Its discovery would make the redistribution to residential less burdensome if not prevent it altogether. It is also to be

noted that the extent of this untapped potential is either known by or can be found out by the Mayor's office and perhaps, until there is complete revaluation by no one else. (As a point of information, it is worth noting that the Boston property tax takes 33.7% of gross income, while the corresponding figures for New York and Chicago are 42.4% and 26.5% according to the Owners and Managers Association International, as reported in the Boston Globe at page 23 on January 3, 1974. That piece goes on to state that for Boston the figure is some 20 to 30% for newer buildings, but over 30% is the rule for older buildings.)

Residential - Old and New

The ASR of .27 for all residential property--"old" and "new"--is the figure given for all residential (nonfarm) property for Boston City in U.S. Bureau of the Census, Census of Governments, 1972, Volume 2, Taxable Property Values and Assessment-Sales Price Ratios and Tax Rates, U.S. Government Printing Office, Washington, D.C., 1973, p. 127.

Other

As noted earlier the ASR of .23 is that reported for vacant plotted land (the predominant component of Other) in the 1972 Census of Governments.[1]

Evaluating Our Estimates

We noted above that while at every juncture we chose those assumptions and data that seemed most "appropriate", the wide variety of plausible alternatives not chosen suggests that our estimates cannot be validated on *a priori* grounds, but, like the pudding of the proverb, can only be evaluated in the eating.

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[1] U.S. Bureau of the Census, Census of Governments, 1972, Volume 2, Taxable Property Values and Assessment - Sales Price Ratios and Tax Rates, U.S., U.S. Government Printing Office, Washington, D.C., 1973, p. 127.

Therefore it is quite comforting to find that the assessed value estimates conform very closely to two control totals:

1. The Boston Assessors Office tabulation of taxable assessed value in 1972 was $1,532 million. Our estimate of taxable assessed value, independently derived from our market value estimates, is $1,510 million, which differs from the tabulated total by less than 2 per cent.

2. For 1966 (the most recent year for which such a breakdown was available), the Census of Governments, 1967 puts Commercial Property at 55.4 per cent of total assessed value of taxable real property, residential at 41.1 per cent and Other at 3.4 per cent. Our estimates for 1972 for these three classifications are 52.7 per cent, 43.9, and 3.4 respectively. The similarity in the proportion accounted for by Other in the two totals simply reflects our methodology. But the close correspondence for the other two categories suggests to us that some measure of confidence can be placed in our estimate of market values and the assessed values derived from them.

Of course, the results just reported could be consistent with major errors in the specific categories making up the Commercial total or in the division between "old" and "new". This suggests that we can place more confidence in the broad redistribution of property tax liability between commercial and residential that is indicated by our estimates than we can in the redistributions within the Commercial total. But, after all, it is the former redistribution, not the latter, that is our prime concern.

IV. WHAT CAN THE MAYOR DO?

While no elected official is likely voluntarily to undertake a tax policy irritating to sensitive sectors--the voting public (in their guise as homeowners and renters) and property developers--the Mayor of Boston may not be able to avoid doing so. The likelihood is great that the courts will soon mandate putting the property tax on a market value base.

When that happens, he can avoid the large redistribution of tax liability, described earlier as likely, only by finding more revenue. This can come from the property tax by extending it to real estate that the city does not now reach, or by getting more revenue from an additional tax not now levied by the city, or by stepped up grants-in-aid from the Commonwealth or the Federal government. With additional revenues in prospect Boston could lower the effective rate of property tax and thus moderate the tax increases that most homeowners and others would otherwise experience on the adoption of market value assessment. For example, if $55 million could be obtained from some other source and the property tax take reduced by this amount, it would become an effective levy of 5.4 per cent on market value, so that, on average, residential property, which is paying at just about that rate now, would find its property tax liability unchanged. And if even more were forthcoming, say $75 million, then most residential properties would pay a lower property tax even under market value assessment.[1] The $55 to $75 billion required is between 20 and 25 per cent of the present level of property tax collections. Where could such a sum come from? The answer obviously is a major study in itself. The several

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[1] Of course "old" commercial properties presently taxed would enjoy even more substantial declines than those suggested in our Tables. But the envy that this would cause among owners of residential property is not likely to be as distressing politically as their anger in the face of full value assessment with no cut in the tax rate.

conjectures that make up the rest of this section are not the major contribution of our study. We bring them up here in the hope that they will induce others to join the discussion of alternatives or additional measures that might be employed. Our remarks are quite selective; the failure to cover a number of well thought-out proposals already put forth should not be taken to imply criticism of them.

1. For a start, it is not unlikely that more could be wrung out of the property tax by identifying and placing on the rolls taxable property that is not now there and by getting new property on the rolls more rapidly. The Jacobs report noted below pointed to a substantial shortfall between what the construction data suggested additions to the taxable rolls should be and what they, in fact, were. Whether this property is really "missing" or whether the explanation lies in a long lag in administration is not really important. Whether "found" or more speedily put on the rolls, some property not now taxed could be. Property tax revenues could be increased, or for an unchanged amount of property tax collections tax rates could be lowered. The amount of property involved here is not enough to solve the problem, but it might help substantially.

A recent report by the Jacobs company provides the following data that permit a comparison of new construction and increases in the valuation roll over several years.

	New Construction Reported by Building Department			Value Increases Reported by Assessing Department
	Total	Non-Taxable	Net Taxable	Total
			(In Millions)	
1967	$231	$66	$165	$36
1968	211	32	179	22
	442	98	344	58

(Source: The Assessing Function in Boston: A Study of the Property Study of the Property Assessment Process in the City of Boston and the Impact of Existing Tax Laws, Prepared for the Boston Finance Commission by the Jacobs Company, Inc., June, 1971, p. 83.)

While building department records indicated $344 million of new taxable construction over the two years, 1967 and 1968, taxable valuations rose by only $58 million. Discrepancies of this magnitude are probably not due to a single factor; by way of explaining the shortfall, we can suggest these possibilities: (1) Assessed values are below market value; (2) some properties get "lost"; and (3) there is a lag in getting properties on to the tax rolls. To the extent that the two latter reasons explain the gap (the Jacobs report, page 84, implies they are important in this connection), then by improving the administration of the property tax Boston could raise the same amount of revenue it currently does with a lower tax rate.

This is only one instance of the rate reduction potential of administrative improvements in the property tax. For a careful documentation of the opportunities (or needs, if one prefers) in this connection, see the Jacobs Report noted above.

In summary, then, one answer to the question "What Can the Mayor Do?" is simply to improve property tax administration. This is something he should do in any case in order to make the most of the new property record

system now in the process of installation, but it could be that a mandated shift to full value assessment would sharpen the perception of the need and energize the will to undertake the task.

2. A tempting area to search for additions to the property tax base would appear to be property presently exempt from tax. In total, assessed value tax-exempt property at $1,725 million (in 1970) exceeds taxable property--$1,617 million. Even more to the point, whereas taxable real property increased by $280 million between 1960 and 1970, the value of tax-exempt property rose by $850 million. If relative rates of growth of this order of magnitude were to continue for the next decade, merely slowing down the additions to the tax-exempt sector by a more rigorous interpretation of the exemption privilege could add importantly to the tax base.

The present stock of tax-exempt real property appears a tempting target, but the allure dissipates quickly when one examines its composition.

Distribution of Exempt Property
in Boston, 1969

Category	Percent of Total
United States of America	4.0%
Commonwealth of Massachusetts	42.3
City of Boston	33.3
Literary and Scientific	6.1
Charitable and Benevolent	3.9
Religious	2.7
Cemeteries	6.1
Other	1.4

Boston is a capital city; consequently the vast mass of tax-exempt property, 80%, is owned by government. But this concentration, in fact,

suggests an opportunity. While government property cannot now be taxed, the city could well seek payments from the Commonwealth and the Federal government in lieu of taxation. Mayor White has recently made a proposal in this connection to the effect that the Commonwealth pay in lieu of property tax a sum equal to 20 per cent of the property tax that would have been due if their properties had been subject to tax. If accepted, this proposal alone would permit a 4-5 per cent cut in the tax rate. A further cut of the same magnitude could be supported by getting half the non-government properties presently exempt from tax on the tax rolls.[1] This is probably unlikely to be accomplished, but, needless to say, the Mayor should push as hard as he can in this area. Also, of course, he need not remain content with in lieu payments equal to one-fifth of the tax that might have been due, but could press for a higher percentage.

Given his present fiscal powers these two areas--(1) improved property tax administration, and (2) curbing and reversing tax exemption and obtaining in lieu payments with respect to it--exhaust the opportunities available to the Mayor of Boston, who basically is limited to the real property tax in his search for revenue. Of course the Mayor can also levy charges and fees, and undoubtedly there is some revenue potential here, but as a quick judgement (and necessarily, therefore, provisional), there does not seem to be a great deal here. Moreover, the Mayor would be well advised to pay prime attention to allocation effects, rather than maximum revenue in designing the structure of fees and charges.

3. Right now the Mayor would probably like the power to tap a new major revenue source. Were he required to tax property at full market value,

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[1] New York City has recently successfully added to the tax rolls the property of bar associations and scientific organizations as a result of legislative and judicial action. See Association of the Bar of the City of New York v. Tax Commission - New York Court of Appeals - (May 8, 1974).

he would feel the need more intensely. Were he able to add some points to the sales tax for city use or the institute a city income or payroll tax, the City could raise enough to support a sizeable cut in the property tax rate. So another course of action for the Mayor is to seek the power to levy one or several new major taxes.

Of course, to relieve the rate of property tax, it is not necessary that the City do the job. It could be effectuated (and, perhaps in a superior fashion) by actions at the state level. Increased state income and sales tax revenues could be used by the state to finance or assume the operation of selected municipal programs such as mass transportation, parks, refuse disposal, courts, libraries; or to finance all or part of the cost of state-mandated property tax exemptions based on personal characteristics (age, widow, veteran) of the owner-occupant. A particularly promising approach, we think, is embodied in the Master Tax Plan Commission proposal which would, in essence, (1) abate the effective rate of property tax for local governments in the Commonwealth by converting the tax substantially to an almost uniform, state-wide levy for local government use, (2) keep the property tax to a specified (and lower than at present) fraction of total Commonwealth and local revenues, and (3) have the state increase sales and income taxes to raise the additional funds needed by local government. The Mayor of Boston could only applaud any recasting of revenue structure to give the state and the broad revenue raisers it has exclusive use of--income and sales taxes--a greater role and the property tax a lesser one, provided Boston received its proper share of the revenues so raised.[1] One

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[1] Changes of the sort envisioned by the Master Tax Plan Commission carry with them a complete overhaul of the formulas and arrangements for state aid to local government. Moreover, the present suit, Town of Sudbury v. Metaxas, may well precipitate state legislative action on state aid distribution. It is therefore only of temporary importance to note that full valuation under current state aid arrangements may be costly to Boston.

more thing the Mayor can do, then, is to support and encourage greater use of the income tax and, possibly the sales tax as well, and a smaller rôle for the property tax. Given the present distribution of fiscal powers between the Commonwealth and its cities and towns, this means exhorting and encouraging the Commonwealth to undertake the initiative and responsibility. A strong effort to get the Master Tax Plan Commission to issue its final report would be an important first step.

4. Another interesting proposal is the subject of a recent report by the Boston Urban Observatory.[1] In this study a case is made for State assumption of responsibility for a range of municipal services including: Public Transit and Safety, Solid Waste and Sewage, Health and Hospitals, Regional Parks and Recreation, and some others. The tax-saving involved for Boston would, it is estimated, "be equivalent to about 26 per cent of the 1973 property tax levy."

In brief summary, it appears that there are real possibilities of raising additional revenues from other sources and/or shifting the fiscal responsibility for some expenditures currently financed by Boston, to permit a shift to full-value property taxation without unduly increasing the taxes due from the "average" home owner.[2] But the Mayor of Boston cannot pull the necessary levers on his own. Cooperation and involvement at the State level will be required.

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[1] The Boston Urban Observatory, Reallocation of Responsibilities and/or Financing for Selected Municipal Services to the State: A Municipal Finance Alternative, October, 1973.

[2] Attendant upon the new assessment, however, residential properties now grossly relatively under-assessed or over-assessed would have major changes in their tax bill.

APPENDIX I

THE ITERATIVE PROCESS AND THE LONGER RUN

The market values in Table I on which our discussion of tax liability redistribution has been based, are, to the best of our ability, estimates of the values that obtain currently (as of the end of 1972). We base our discussion on them because, as explained in the text, they are the relevant values for the policy debate and analysis of initial impact of the change in tax assessments. Moreover, in reaching these values, we took it as given that assessors, facing the possibility that their valuations will be challenged and, perhaps, brought to litigation, will base their values on the "observable" evidence - what the property could be sold for at the time of valuation.

While defensible on this basis, the period over which this set of market values would be valid is likely to be of short duration. For as soon as a new distribution of a given total tax liability is struck, every property can be expected to have a new market value that reflects the change in its tax.[1] In the aggregate, the market value of property in Boston will remain the same (since the total tax levied on it would not change), but all properties whose taxes are now higher will fall in value, while those enjoying lower tax liabilities will be worth more than before. So a second set of market values would be established by going to full value assessment, aggregate tax collections (i.e., the effective rate on real estate in the aggregate) remaining unchanged. But this set of market values, too, will prove evanescent, as a new distribution of tax liabilities based on them will, once again, induce a change in the underlying structure of values, etc.

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[1] We note, but disregard as beyond our capacity to handle analytically, the real possibility that market values might well change in anticipation of changes in tax liability.

This can be illustrated with the data of one of our broad classes of property. With the total market value of taxable property in Boston estimated at $4,653.0 million and property tax liabilities totalling $306.4 million, the effective rate of tax over each and every property under full value assessment would be 6.585%. Assume that the capitalization rate for real estate in Boston is 10%; in other words real estate sells for ten times its net earnings.[1] Then were "old" commercial construction, for example, taxed on its estimated market value of $1,279 million at the rate of 6.585%, it would have a tax bill of $84.22 million, which is $51.52 million less than its present tax load of $135.74 million. (See Tables II and III). Net income from this class of property will be higher by the amount of the decline in tax, so the value of "old" commercial property should increase by $515.2 million.[2] "Old" commercial property now worth $1,794.2 and assessed for tax on its market value would now be liable at an unchanged effective rate of 6.585%; a total of $118.15 million in property tax would be due from this class. This is an increase of $33.93 million over the last period's tax, and would mean, therefore, a decline in market value of $339.3 million; i.e., from $1,794.2 million to $1,454,9 million. But this new market value would have a new tax liability associated with it, which would cause a further change in market value, etc.

The illustrative tale could be spun out interminably, since, in fact, there would be an infinite number of changes in market value in this process.

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[1] This assumption determines the particular value of the example, but does not affect the basic nature of the underlying process itself - as long as the capitalization rate is greater than the effective rate of property tax. (See below for amplification).

[2] Residential and "other" would, for similar reasons, fall in value. The market value of taxable property in the aggregate would remain the same.

But as long as the capitalization rate exceeds the rate of effective tax, the process is convergent. Moreover, under reasonable conditions market value will come within 1 per cent of its limiting value with a fairly small number of iterations.

Our understanding of this process and the analysis that follows draws very heavily on the work of Dennis Dickstein.[1] Following Dickstein, define:

V_i = Value of property at time i

T_i = Tax on Property at time i

C = Capitalization rate

E = Effective rate of tax on market value.

Start the process of tax change, value change, tax change, etc. after the first set of new tax liabilities which determine the tax change, ΔT_1, under full value assessment have been determined. Then for any given property or class of property, Dickstein derives the following:

(1) $\Delta V_1 = \Delta T_1/C$

(2) $\Delta T_2 = \Delta V_1 \cdot E$ also $\Delta T_2 = \Delta T_1(E/C)$

(3) $\Delta V_2 = \Delta T_2/C$ also $\Delta V_2 = \Delta T_2/C$

$= \Delta V_1 \cdot E/C$ $= \Delta T_1(E/C^2)$

(4) $\Delta T_3 = \Delta V_2 \cdot E$ also $\Delta T_3 = \Delta V_2 \cdot E$

$= \Delta V_1 \cdot E^2/C$ $= \Delta T_1(E^2/C^2)$

(5) $\Delta V_3 = \Delta T_3/C$ also $\Delta V_3 = \Delta T_3/C$

$= \Delta V_1 \cdot E^2/C^2$ $= \Delta T_1(E^2/C^3)$

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[1] See Dennis Dickstein, The Effect Property Taxes Have on Property Values: A Study of a Specific Situation, (unpublished undergraduate thesis), Massachusetts Institute of Technology, Department of Urban Studies and Planning, 1974.

Or, in the general case,

$$(6)\quad \Delta V_n = \Delta V_1 \cdot E^{n-1}/C^{n-1}$$

$$(7)\quad \Delta T_n = \Delta T_1 (E^{n-1}/C^{n-1})$$

If $E > C$, then the changes in tax and value get larger with successive iterations in the process since the value of $(E/C)^{n-1}$ increases with n.

If $E = C$, the value of $(E/C)^{n-1}$ is constant. The process would not converge. The same tax and value changes would occur period after period.

If $E < C$, $(E/C)^{n-1}$ approaches zero as n gets larger; hence the tax and property value change would be smaller with successive periods. The process tends to converge, but reaches its limiting value only after an infinite number of "iterations". Since each iteration is conceptually a new valuation, it would appear that even in this case, i.e., $E < C$, Boston (or any assessing jurisdiction) would never reach the underlying structure of market values.

But it could come suitably close to the limiting value with relatively few iterations. E, as computed in our study, is 6.576%. C, of course is a matter of conjecture. But we can take it, with some degree of certainty, that it lies somewhere between 8 and 15 per cent. Therefore the relevant E/C probably lies between .822 and .438. Thus if it is deemed sufficient for the purpose to get the process to the point where tax and value changes would be less than 5 per cent with each iteration, somewhere between 4 and 14 iterations would be required; for a sterner standard - say, a market value and tax change of less than 1 per cent in ensuing iterations, somewhere between 7 and 25 iterations would be necessary.

It may be helpful at this point to continue the numerical illustration of the process, using the data for "old" commercial property, which we

explained and calculated out for several periods a few pages earlier. In Table AI-1 appear the numbers through the first 10 iterations. Notice how rapidly the magnitude of the change in property tax and market value declines. By the sixth iteration the respective changes are under 5 per cent of the initial tax liability and market value; by the tenth iteration the changes are under one per cent. Note, too, how rapidly the tax liability and market value approach the limiting value, i.e., the value after an infinite number of iterations.

In Table AI-2, we list the final (in the limit) tax liabilities and market values for broad categories of property under two assumed capitalization rates. While these are the values that would apply after an infinite number of iterations, it may help the reader to consider them as arising from a different process, analytically permissible, but legally questionable. Specifically, these limiting values can be derived by assuming that: (1) Boston assessors capitalize income streams to establish values, using in the process a pre-tax income stream, i.e., current income plus tax liability. (2) The given total of property tax to be collected is allocated to each property according to its proportion of value as calculated under (1) above.

For example, were there no property tax and the capitalization rate was 10%, "old" commercial property would be worth $2,640 million, since its after tax net income of $128 million (10% of the current market value of $1,279 million) would be augmented by what had gone in tax payments of $136 million, giving an income stream of $264 million, which would have a market value, assuming a 10% capitalization rate, of $2,640 million. Valuing other property the same way gives an aggregate total of $7,730 million. "Old" commercial is 34.2% of this, so taking 34.2% of the requisite aggregate tax

TABLE AI-1

Tabulation of Successive Iterations, "Old" Commercial Property, Assuming Capitalization Rate of 10% - Boston, 1972
(Dollar Amounts in Millions)

Period	TAX Start of Period	TAX End of Period	TAX Change in Period	MARKET VALUE Start of Period	MARKET VALUE End of Period	MARKET VALUE Change in Period
1	$135.74	$84.22	$-51.52	$1,279.0	$1,794.2	$+515.2
2	84.22	118.15	+33.93	1,794.2	1,454.9	-339.3
3	118.15	95.81	-22.34	1,454.9	1,678.3	+223.4
4	95.81	110.52	+14.71	1,678.3	1,531.2	-147.1
5	110.52	100.83	-9.69	1,531.2	1,628.1	+96.9
6	100.83	107.21	+6.38	1,628.1	1,564.3	-63.8
7	107.21	103.01	-4.20	1,564.3	1,606.3	+42.0
8	103.01	105.77	+2.76	1,606.3	1,578.7	-27.6
9	105.77	103.96	-1.81	1,578.7	1,596.8	+18.1
10	103.96	105.15	+1.19	1,596.8	1,584.9	-11.9
Limiting Value [1/]		104.80			1,592.0	

[1/] See Table AI-2 below, and accompanying explanations.

TABLE AI-2

A Comparison of Current (1972) and Final (In the Limit)
Market Value, for Broad Categories of Property,
Assuming Capitalization Rates of
10 or 15 Per Cent - Boston

(1)	Market Value			(5)	(6)	(7)	(8)
Property Category	(2) Current	(3) Limiting with 10 Per Cent Capitalization Rate	(4) Limiting with 15 Per Cent Capitalization Rate	(2)-(3)	(3) as a Per Cent of (2)	(2)-(4)	(4) as a Per Cent of (2)
"Old" Commercial	$1,279	$1,592	$1,521	$313	24.5%	$242	18.9%
"New" Commercial	696	580	601	-116	-16.7	-95	-13.6
Residential	2,456	2,300	2,330	-156	-6.4	-126	-5.1
Other	222	194	199	-28	-12.6	-23	-10.4

liability of $306.4 million, furnishes a figure of $104.8 million due from "old" commercial. The after-tax income stream from this category, then, would be $159.2 million, which capitalized at 10 per cent gives a figure of $1,592 million. (Incidentally, Dickstein explains that this procedure would involve unequal rates of tax on properties in different categories, something not permitted by law. That is why he developed his discussion of the iterative process.)

The discussion in the text focusses, for reasons explained, on the very short-run changes in the property tax liability of the various categories of property attendant on a shift to full-value assessment. The estimates in this Appendix direct attention to the "final" (or longer run) redistribution and suggest that in the longer run, the switch to market value assessment would lead to less severe tax liability and property value changes than are indicated by the first iteration, which is our major concern in the text.

APPENDIX II

SAMPLES OF "NEW" PROPERTIES USED IN DERIVATION OF ASSESSMENT-SALES RATIOS

Commercial Office Space

address	assessment	development cost	ratio
1 Boston Place 778,083 sq. ft.	$6,626,000	$41,766,804	.16
1 Washington Mall 128,000 sq. ft.	$1,668,700	$ 6,784,000	.25
161 Cambridge St./ 100 Charles River 130,000 sq. ft.	965,000	6,890,000	.14
16 North St. 11,000 sq. ft.	275,000	583,000	.47
25 New Chardon St. 45,000 sq. ft.	650,000	2,385,000	.27
1,2,3, Plaza Ctr. 540,000 sq. ft.	4,305,000	28,620,000	.15
40 Hawkins 64,000 sq. ft.	1,300,000	3,392,000	.38
15 New Chardon 64,000 sq. ft.	620,000	3,624,564	.17
99 High St. 727,000 sq. ft.	6,900,000	38,531,000	.18
55 Court Sq. 36,900 sq. ft.	450,000	1,955,700	.23
70 Federal 48,750 sq. ft.	801,600	2,583,750	.31
100 Federal 1,240,000 sq. ft.	9,300,000	65,720,000	.14
520 Boylston 70,000 sq. ft.	1,300,000	3,710,000	.35
535 Boylston 69,600 sq. ft.	1,300,000	3,688,800	.35
28 State St. 570,000 sq. ft.	6,500,000	30,210,000	.22
TOTAL (THOUSANDS)	42,961	240,445	Weighted avg. .18

Retail

address	assessment	development cost	ratio
1660-1680 Soldiers Field Rd. 21,000 sq. ft.	470,000	672,000	.70
170 Western Ave. 90,240 sq. ft.	17,500	90,240	.19
160-234 Mt. Vernon 311,155 sq. ft.	1,525,000	9,956,960	.15
24-28 Washington 13,608 sq. ft.	93,000	435,456	.21
883 Blue Hill Ave. 1040 sq. ft.	20,000	33,280	.60
755-757 Gallivan 22,701 sq. ft.	146,600	726,432	.20
690-710 Am. Legion Hwy. 91,987 sq. ft.	210,000	2,943,584	.07
413 Centre 12,996 sq. ft.	110,000	415,872	.26
1999 Centre St. 15,295 sq. ft.	185,000	489,440	.38
1457 VFW Pkwy. 2800 sq. ft.	18,800	89,600	.21
175 Spring 3200 sq. ft.	20,500	102,400	.20
1260-1274 Commonwealth 17,600 sq. ft.	184,000	563,200	.33
502 Cambridge 1690 sq. ft.	35,000	54,080	.65
TOTAL (THOUSANDS)	3,036	16,571	Weighted avg. .18

Manufacturing

address	assessment	development cost	ratio
99 Atkinson Am. Brush Co. 52,900 sq. ft.	$155,000	$ 1,110,900	.14
26 Damon St. Westinghouse 114,852 sq. ft.	235,000	2,346,016	.10
20 Gilette Park Gillette Co. 260,000 sq. ft.	2,402,300	5,200,000	.46
240 Southampton Fulton Packing 45,000 sq. ft.	750,000	900,000	.83
225 Fivermoor St. Still Co. 94,500 sq. ft.	445,000	1,890,000	.83
854-912 River St. Tileston-Hollingsworth 103,412 sq. ft.	400,000	2,068,240	.19
TOTAL (THOUSANDS)	4,387	13,515	Weighted avg. .19

Warehousing

address	assessment	development cost	ratio
490 R Rutherford Chstn. 40,300 sq. ft.	$108,000	604,500	.18
440-450 Summer St. S. Bstn. 300,000 sq. ft.	602,000	4,500,000	.113
99 Rivermoor St. W. Roxbury 84,200 sq. ft.	353,800	1,263,000	.28
647 Summer St. S. Bstn. 350,000 sq. ft.	575,000	5,600,000	.10

arehousing (continued)

) Trilling Way Boston 119,200 sq. ft.	275,000	1,785,000	.15
Freeport St. r. 132,400 sq. ft.	140,000	2,118,400	.07
9 Summer St. Bstn. 44,000 sq. ft.	171,000	704,000	.24
TAL HOUSANDS)	2,225	15,855	Weighted avg. .14

P52 B2
Boston Urban Observatory.
Estimating the impact of %100
of market value property tax.

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